

### **REMARKS**

The Office Action dated May 15, 2006 has been received and carefully noted. The above amendments to the claims, drawings, and the following remarks, are submitted as a full and complete response thereto. Applicants submit that no new matter has been introduced via the above noted amendments, and claims 21 and 23-42 are pending and submitted herewith for consideration.

In paragraphs 2 and 3 of the Office Action, Figure 3 was objected to for containing reference numbers 88 and 56, both designating a filter. Applicants note that reference numeral 88 is not used in Figure 3, and therefore, Applicants assume that the Office Action is referring to Applicants' use of reference numerals 58 and 56 referring to the prefilter and DFSE. Therefore, in response thereto, Applicants have amended Figure 3 to clearly illustrate that 56 refers to a prefilter and 58 refers to the DFSE. Additionally, the Office Action objected to Figures 2 and 3 for using reference numeral 72 to represent the receive chains in Figure 2 and the joint optimizer in Figure 3. In accordance with the specification, Applicants have amended Figure 3 to indicate that reference numeral 74 represents the joint optimizer. Applicants have submitted herewith substitute drawing sheets for all of the Figures in accordance with 37 CFR §1.121(d), and as such, reconsideration and withdrawal of the drawing objections is respectfully requested.

Claims 29, 36, and 38-41 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants have amended the claims to correct

the issues noted in the rejection, and as such, reconsideration and withdrawal of the rejection is respectfully requested.

Claims 21, 26, 30, 32, 34, 36, and 38 stand rejected under 35 U.S.C. §102(e) as being anticipated by *Stenstrom* (U.S. Patent No. 6,466,616). The Office Action took the position that *Stenstrom* teaches each and every element recited in the rejected claims. Applicants traverse the rejection and respectfully submit that each of claims 21, 26, 30, 32, 34, 36, and 38 recite subject matter that is not taught or disclosed by *Stenstrom*.

Applicants' independent claim 21, upon which claims 23-31 are dependent, recites a receiving station for a communication system. The receiving station includes a signal filter in communication with a signal receiving antenna, a signal estimator in communication with the signal filter, a signal optimizer in communication with the signal filter, and a decision feedback sequence estimator in communication with the signal optimizer. The decision feedback sequence estimator includes a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element.

Applicants' independent claim 32, upon which claims 33-37 are dependent, recites a method of communicating via a multiple input-multiple output communication system. The method includes receiving a data vector, forming optimized feed forward filter parameters from the data vector, forming optimized feedback filter parameters from the data vector, applying the optimized feed forward filter parameters to a feed forward filter

to define filter characteristics of the feed forward filter, applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter, and simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters.

Applicants' independent claim 38, upon which claims 39-42 are dependent, recites a receiving station for a communication system. The receiving station includes signal filter means in communication with a signal receiving antenna, signal estimator means in communication with the signal filter means, signal optimizer means in communication with the signal filter means, and interference cancellation means in communication with the signal optimizer means.

Applicants submit that each of claims 21, 26, 30, 32, 34, 36, and 38 recite subject matter that is not taught or disclosed by the cited prior art reference.

*Stenstrom* teaches an apparatus and method are provided that effectively minimizes the computational load and reduces the overall power consumption in a receiver by adjusting the number of taps used in a pre-filter and an equalizer. More specifically, the apparatus includes a memory for storing a signal, and a channel estimator for estimating a quality parameter and a number of channel filter taps using the stored signal. The apparatus further includes a controller for evaluating the estimated quality parameter and the estimated number of channel filter taps to determine a number of pre-filter taps, if any, to be used in the pre-filter. In addition, the controller evaluates the estimated quality parameter and the estimated number of channel filter taps to

determine a number of equalizer taps to be used in the equalizer where the number of equalizer taps is less than or equal to the estimated number of channel filter taps.

However, *Stenstrom* does not teach or disclose a decision feedback sequence estimator, as recited in Applicant's independent claim 21. Additionally, *Stenstrom* does not teach or disclose that the decision feedback sequence estimator includes a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element, as recited in Applicants' independent claim 21. *Stenstrom* also does not teach or disclose applying optimized feed forward filter parameters to a feed forward filter to define filter characteristics of a feed forward filter, applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter, and simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters, as recited in Applicants' independent claim 32. *Stenstrom* also does not teach or disclose an interference cancellation means in communication with a signal optimizer means, as recited in Applicants' independent claim 38. Therefore, in view of *Stenstrom* failing to teach or disclose each and every element recited in Applicants' independent claims 21, 32, and 38, reconsideration and withdrawal of the rejection of claims 21, 32, and 38, along with each claim depending therefrom, is respectfully requested.

Claims 22-25, 28-29, 33, 39-42 stand rejected under 35 U.S.C. §103(a) as being obvious over *Stenstrom* (US Patent No. 6,466,616) in view of *Zangi* (US Patent No. 6,775,322). The Office Action took the position that *Stenstrom* teaches each and every element recited in claims 22-25, 28-29, 33, and 39-42, except for the equalizer containing a summing device. However, the Office Action cites to *Zangi* as teaching this feature, and as such, the Office Action concluded that it would have been obvious to one of ordinary skill in the art to have combined the teaching of the references to generate Applicants' claimed invention. Applicants traverse the rejection and respectfully submit that the cited combination of references, when taken alone or in combination, fails to teach, show, or suggest each and every limitation recited in claims 22-25, 28-29, 33, and 39-42.

Applicants' independent claims 21, 32, and 38, the independent claims from which claims 22-25, 28-29, 33, and 39-42 are dependent, are discussed above, as is *Stenstrom*. *Zangi* teaches a computationally efficient method for computing the filter coefficients for a prefilter in a decision feedback equalizer solves linear equations using a fast Toeplitz algorithm. Computations performed to compute the filter coefficients for the right half burst may be used to compute the prefilter for the left hand burst, thereby reducing the number of computations. Also, a square root-free algorithm may be used to solve the system of linear equations, further reducing computational complexity.

However, *Zangi* does not teach, show, or suggest decision feedback sequence estimator (DFSE), or that the DFSE includes a prefilter, a summing element in

communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element. *Zangi* also does not teach, show, or suggest applying optimized feed forward filter parameters to a feed forward filter to define filter characteristics of a feed forward filter, applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter, simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters, or interference cancellation means in communication with a signal optimizer means. Each of the above noted limitations are expressly recited in Applicants' claims 22-25, 28-29, 33, 39-42, and since *Zangi* does not teach any of the above noted limitations, Applicants submit that *Zangi* fails to further the teaching of *Stenstrom* to the level necessary to properly support an obviousness rejection. As such, reconsideration and withdrawal of the rejection of claims 22-25, 28-29, 33, 39-42 is respectfully requested.

Claims 31 and 32 were rejected under 35 U.S.C. §103(a) as being obvious over *Stenstrom* in view of *Malkemes* (US Publication No. 2002/0106040 A1). The Office Action took the position that *Stenstrom* teaches each and every element recited in claims 31 and 32, except for the receiving chains. However, the Office Action cites to *Malkemes* as teaching this feature, and as such, the Office Action concluded that it would have been obvious to one of ordinary skill in the art to have combined the teaching of the references to generate Applicants' claimed invention. Applicants traverse the rejection

and respectfully submit that the cited combination of references, when taken alone or in combination, fails to teach, show, or suggest each and every limitation recited in claims 31 and 32.

Applicants' independent claim 21, the independent claim from which claim 31 depends, and independent claim 32 are discussed above. *Malkemes* teaches a spatial diversity combiner that includes a plurality of feed forward equalizers (FFE), a decision feedback equalizer (DFE), and a tap control circuit. The plurality of FFEs receive spatially diverse replicas of an RF signal and optimally combine them. The DFE provides feedback for tap weight control and optimal equalization of the transmission channel. Symbol error is generated by a slicer circuit or by a maximum likelihood sequence estimation (MLSE) process.

However, *Malkemes* does not teach, show, or suggest decision feedback sequence estimator (DFSE), or that the DFSE includes a prefilter, a summing element in communication with the prefilter, a feedback filter in communication with the signal optimizer and the summing element, and a maximum likelihood sequence estimator in communication with the summing element. *Malkemes* also does not teach, show, or suggest applying optimized feed forward filter parameters to a feed forward filter to define filter characteristics of a feed forward filter, applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter, or simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters. Each of the above

noted limitations are expressly recited in Applicants' independent claims 21 and 32, and since *Malkemes* does not teach the above noted limitations, Applicants submit that *Malkemes* fails to further the teaching of *Stenstrom* to the level necessary to properly support an obviousness rejection of the rejected claims. As such, reconsideration and withdrawal of the rejection of claims 31 and 32 is respectfully requested.

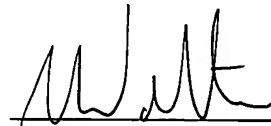
In conclusion, Applicants submit that each of claims 21 and 23-42 recite subject matter that is not taught, disclosed, or otherwise suggested by the cited references, when taken alone or in combination. Reconsideration and withdrawal of the rejections is respectfully requested. Claims 21 and 23-42 are pending and respectfully submitted for consideration.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.



In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'N. Alexander Nolte', is written over a horizontal line.

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Enclosures: Replacement Sheets (6)

**IN THE DRAWINGS:**

Submitted herewith are corrective formal drawings labeled as Replacement Sheets to replace previously submitted Figures 1 - 6.